

3AMAS Exam revision answers

1(a) $a = 4$ (b) \leq (c) $-7.26 < x < 8.26$

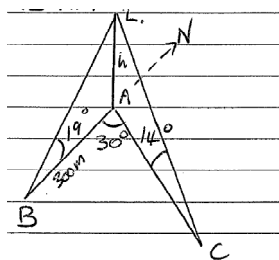
2. $\{x \in \mathbf{R}: x < -4\} \cup \{x \in \mathbf{R}: x > -2\}$

3. $\{x \in \mathbf{R}: -2.25 < x < -1.5\}$

4. $a = b = 7$

5(a) $AC = 76.4\text{cm}$ (b) 39.2cm^2

6. 15793km

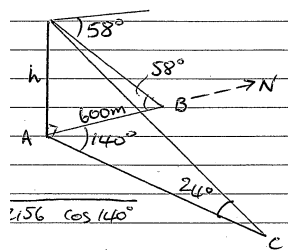


7(a)

(b) 103.3m (c) 414.3m (d) 215.3m

8(a) 7.88m (b) 4.01m (c) 4.33cm^2

9. $6\,661\text{km}$



10(a)

(b) 960m (c) 2644m (d) 148°

11(a) 264mm (b) 68°

12(a) 12 (b) $12\sqrt{5}$ (c) $\frac{3\sqrt{5}}{20}$ (d) $\frac{4-\sqrt{7}}{3}$

13(a) $\frac{-\sqrt{3}}{3}$ (b) $\frac{\sqrt{2}}{2}$

14. $(R + r)\sqrt{Rr} - \frac{1}{2}(R^2 - r^2)\cos^{-1}\frac{R-r}{R+r} - \frac{1}{2}\pi r^2$

15. 49.49° (or $0.74^{\text{RADIAN}}\text{S}$)

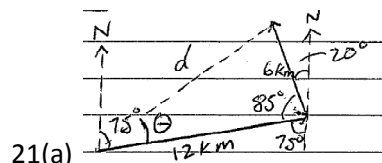
16(a) i. $-\frac{\sqrt{2}}{2}$ (or $-\frac{1}{\sqrt{2}}$) ii. $\frac{\sqrt{3}}{3}$ (or $\frac{1}{\sqrt{3}}$) (b) $\frac{3}{4}$ (c) $12\sqrt{3}$

17(a) 19.4m (b) 87°

18. $y = \frac{2\sqrt{2}x \sin \theta \sin \beta}{\sqrt{3}}$

19(a) 69.64cm (b) 21° (c) 67°

20. 184.26cm^2



21(a)

(b) 12.94km

(c) 227°

22. 1410km/h

23. See worked solutions

24(a) 18.66m

(b) 501m

25. 51°

26. At zero height: 27.21 hours. At 10km height: 27.24 hours (about 2 minutes longer)

27(a) $y = 7.64\text{cm}$; $x = 4.50\text{cm}$; $\theta = 41^\circ$

(b) $x = 19.8\text{cm}$

28. See worked solutions

29(a) $4\sqrt{2}$

(b) $5\sqrt{3}$

(c) 12

(d) $\frac{\sqrt{15}-3}{2}$

30. See worked solutions

31. $B = 80^\circ$; $C = 50^\circ$; $c = 7\text{cm}$

32. 7.69cm

33. 70° (North or South)

34(a) 12.65km

(b) 290°

35(i) $\pi - \theta$

(ii) $\frac{1}{2}AO^2(\pi - \theta - \sin(\pi - \theta))$

36(a) 359m

(b) 264mm

(c) 68°

(d) 2.86m

37(a) 1058.4cm^2

(b) 930mm^2

38. $\frac{13\pi}{36}$

39(a) $-\sqrt{3}$

(b) $\sqrt{2}$

40. $y = \frac{x \cos b^\circ}{\tan a^\circ}$

41. Ambiguous: two solutions are necessary for a complete answer:

$C = 62^\circ$; $A = 78^\circ$; $a = 12.2\text{cm}$

Or

$C = 118^\circ$; $A = 22^\circ$; $a = 4.7\text{cm}$

42. 100cm^2

43(a) 6.54cm^2

(b) 0.480cm^2

(c) 2.49cm^2

44. 349m

45. 105m

46. $r = 20\text{m}; h = 32.3\text{m}$

47. 275.7cm^2

48. 7871cm^2

49(a) $\overrightarrow{AB} = \begin{pmatrix} 9 \\ -2 \end{pmatrix}$

(b) $\frac{1}{\sqrt{85}} \begin{pmatrix} 9 \\ -2 \end{pmatrix}$

(c) $5\sqrt{13}$

(d) $-\frac{4}{3}$

50(a) $\mathbf{a} + \mathbf{b}$

(b) $\mathbf{a} - \mathbf{b}$

(c) $\mathbf{a} + 4\mathbf{b}$

(d) $-3\mathbf{a} - \mathbf{b}$

51(a) $12\mathbf{i} - 4\mathbf{j}$

(b) A: $(12\mathbf{i} - 4\mathbf{j}) + t(2\mathbf{i} - 16\mathbf{j})$ B: $(-22\mathbf{i} - 55\mathbf{j}) + t(10\mathbf{i} - 4\mathbf{j})$

52(a)i. $\mathbf{e} - \mathbf{f}$

ii. $\mathbf{f} + \frac{1}{3}\mathbf{e}$

iii. $\frac{3}{4}\mathbf{f} + \frac{1}{4}\mathbf{e}$

(b) Show $\overrightarrow{ON} = \frac{4}{3}\overrightarrow{OT}$

53. $5\sqrt{7}$ units on a bearing of 101°

54. See worked solutions

55. A $(-4, 1)$

B $(2, 6)$

C $(-7, -3)$

D $(-8, -1)$

E $(-2, 12)$

F $(-13, -8)$

G $(-2, 4)$

56. See worked solutions

57. & 58. 35m/s on a bearing of 001°

59(a) 3.2km/h

(b) 008°

60(a) 1.46

(b) 0.5

61. See worked solutions

62(a) 4.09

(b) -0.631

63. 9

64(a) 3

(b) 4

65(a) $40\,680\,000$

(b) $659\,502$

(c) $P_E = 60e^{-0.025t}$ (or $P_E = 60(0.975)^t$)

(d) 28^{th} year (2028)

(e) End of 2013

Note: This question is a poor fit to the work included in the 3AMAS course.

66(a) $y = x$

(b) $y = 2x^2$

67(a) 300 people

(b) after 25 days (i.e. on the 26^{th} day)

68(a) $\frac{3}{x^3}$

(b) $\sin^3 x$

(c) -3

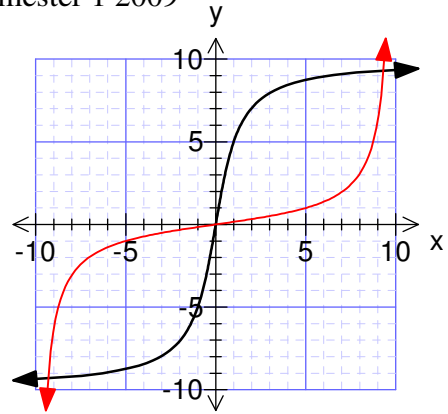
(d) 0.84

(e) $\sqrt[3]{\frac{3}{x}}$

69. If $k(x)$ was defined for all real x the natural domain would be $\{x \in \mathbf{R}: x \leq -1\} \cup \{x \in \mathbf{R}: x \geq 1\}$ but as $k(x)$ is only defined for $x \geq 0$ we have to limit this to $\{x \in \mathbf{R}: x \geq 1\}$.

70(a) $f^{-1}(x) = \sqrt{6-x} + 2$

(b)



71(a) fails horizontal line test

(b) $x \geq 2$ (or $x \leq 2$)

(c) $\{x \in \mathbf{R}: x \geq 0\}, \{y \in \mathbf{R}: y \geq 2\}$ (or $\{x \in \mathbf{R}: x \geq 0\}, \{y \in \mathbf{R}: y \leq 2\}$)

72(a) $A(\cos \alpha, \sin \alpha)$ (b) $B(3\cos \beta, 3\sin \beta)$ (c) $C(\sqrt{2}, -\frac{\pi}{4})$ (d) $D(2, \frac{5\pi}{6})$

73. 18.30

74.

